REMARKS

The following remarks are made in response to the Final Office Action mailed October 18, 2007, in which claims 1-4, 8, 10-17 and 23-27 were rejected and claims 14-15 and 17 were objected to. Claims 5-7, 9, 11-12, 14, 16, and 18-22 have been cancelled. With this Response, claims 1-4, 8, 10, 13, 15, 23, and 26 have been amended. Claims 1-4, 8, 10, 13, 15, 17, and 23-27 remain pending in the application and are presented for reconsideration and allowance.

Claim Objections under 35 U.S.C. § 112

In the Office Action, claims 14, 15, and 17 were objected to for failing to further limit the subject matter of a previous claim.

Claim 14 has been canceled.

Applicants respectfully submit that the limitations of claims 15 and 17 provide meaningful limitations in that they define more specifically parameters of the system of independent claim 13, consistent with the purpose of a dependent claim, which is to further define an aspect of a limitation of an independent base claim or intervening dependent claim.

Applicants note that claim 15 recites use of a cyclic redundancy code (CRC), which is known in the art to be distinct from (or not synonymous with) a Reed-Solomon (RS) code, as evidenced in Wyland U.S. 6,836,867 (cited by Applicants in an accompanying Information Disclosure Statement).

Regarding Applicants' dependent claim 17, the claim specifies a further aspect of the respective encoders and decoders of independent claim 13, as an encoder or decoder does not automatically require burst correction.

Applicants maintain that claim 15 and 17 are an appropriate use of a dependent claim to further define one or more aspects of an independent claim. To this end, Applicants note that they have a statutory basis to claim what the Applicants regard is the invention, even though it may be done with language that the Examiner would not have chosen himself or herself.

Accordingly, Applicants respectfully requests withdrawal of these objections

Claim Rejections under 35 U.S.C. § 103

In the Office Action, claims 1-4, 11-15, 17 and 23-27 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ohyama et al. US Patent 6,772,385 (the Ohyama Patent) in view of the Kobayashi US Patent 5,805,564 (the Kobayashi Patent).

Applicants independent claim 1 specifies an error correction system for coding and decoding at least one information block comprising, among other things: (1) first and second decoders configured to recover the information; (2) the first decoder and the second decoder configured to operate sequentially in time with the first decoder acting first and the second decoder acting second; (3) the first decoder configured to recover the at least one information block using the first parity symbols; and (4) the second decoder configured to recover the at least one information block via the second parity symbols and configured to further remain inactive after operation of the first decoder unless the first decoder is unsuccessful in attempting to recover the at least one information block and until the first decoder provides an indication to the second decoder to initiate recovery the at least one information block.

In contrast, the Ohyama Patent discloses several embodiments in which a second decoder acts on a block automatically following the action of the first decoder on the block. In other words, the second decoder in the Ohyama Patent acts whether or not an error remains after the action of the first decoder, and therefore in the Ohyama Patent, the PO direction error correcting circuit 3022 acts quite differently from the system recited in Applicants' independent claim 1, in which a second decoder is configured to remain inactive during operation of the first decoder and to further remain inactive after operation of the first decoder unless the first decoder is unsuccessful in attempting to recover the at least one information block and until the first decoder indicates an instruction to the second decoder to recover the at least one information block.

For example, one basic decoding pattern is described in the Ohyama Patent at Column 2, lines 10-34, in which a PO direction error correcting circuit 3022 corrects any errors in data buffer 3024 **after** a PI direction error correcting circuit 3020 corrects errors in the data in data buffer 3024, with no stated exceptions for the PO direction error correcting circuit 3022 not to act. Accordingly, this basic decoding pattern apparently always includes the action of the second, PO direction error correcting circuit 3022 regardless of the result of the action of the first, PI direction error correcting circuit 3020. See also the Summary of the Invention, for

example, at Column 10, line 31-46.

In addition, in the context of syndrome calculation, the Ohyama Patent again describes **a second PO directional error correction performed, without exception, after the PI directional error correction**. See Column 3, lines 56-67. Moreover, at Column 4, lines 65-68, the Ohyama Patent emphasizes that "Specifically, error correction of the product code is generally performed in **each** of the directions (PO and PI directions)." (emphasis added).

In another example, the Ohyama Patent teaches that "when the PI-direction error-correction is completed in the third step, PO-direction error-correcting circuit 12 can access data buffer 14 via data bus 13" for performance of the PO-direction error correction (in the fifth step) when the PI-direction error correction in the third step is completed. See Column 16, lines 19-23. Moreover, **regardless of whether the PI-direction error-correcting circuit finds an error or not, a PO-direction error checking/correction takes place** in a PO-direction circuit of either PO-direction error-correcting circuit 12 or PO-direction partial error-checking circuit 8. See Column 16, lines 11-15.

At no time, do these passages allow for skipping the second phase of error correction (e.g., the PO-direction error correction) which is in stark contrast to Applicants' independent claim 1. Finally, other passages such as the embodiment (see Column 30, lines 35-67) described in association with Figures 26-27 do not teach the criteria under which the second-direction error correction would be avoided.

Accordingly, the Ohyama Patent fails to teach or suggest a second decoder configured to remain inactive during operation of a first decoder and to further remain inactive after operation of the first decoder unless the first decoder is unsuccessful in attempting to recover the at least one information block and until the first decoder provides an indication to the second decoder to initiate recovery of the at least one information block, as recited in Applicants' independent claim 1.

Finally, as admitted in the Office Action, the Ohyama Patent fails to disclose first and second encoders corresponding to the PO code and the PI code.

The Kobayashi Patent fails to cure the above-identified deficiencies of the Ohyama Patent. In particular, the Kobayashi Patent teaches a decoding process as illustrated in Figure

9 in which data is regenerated with error detection and correction via **both** ECC decoder 47A and ECC decoder 47B with ECC decoder 47B acting **after** ECC decoder 47B.

The Kobayashi Patent does not appear to provide any exception to ECC decoder 47B acting on the data after the ECC decoder 47A, which is in stark contrast to Applicants' independent claim 1 in which a second decoder is configured to remain inactive during operation of the first decoder and **further remain inactive after operation of the first decoder unless the first decoder is unsuccessful in attempting to recover the at least one information block and until the first decoder provides an indication to the second decoder to initiate recovery of the at least one information block .**

Accordingly, the Kobayahsi Patent fails to cure the deficiencies of the Ohyama Patent.

Neither the Ohyama Patent nor the Kobayashi Patent provide the flexibility of Applicants' claimed system which provides enables fast error checking and correction in instances in which few errors occur and which invokes a higher level of complexity only when needed, i.e. more errors occur. This combination provides faster data processing by limiting the application of high capability error correction circuitry, which takes more time and processing power, only to situations in which it is needed. Both the Ohyama Patent and the Kobayashi Patent appear to maintain use of a second correction scheme, resulting in a much more complex and slower error correction scheme that is not adaptable in the manner of the system of Applicants' independent claim 1.

Accordingly, one cannot combine the Ohyama Patent and the Kobayashi Patent and arrive at Applicants' independent claim 1.

For at least these reasons, the Ohyama Patent and the Kobayahsi Patent fail to teach, suggest, or reasonably make obvious Applicants' independent claim 1, and therefore Applicants respectfully submit that independent claim 1 is patentable and allowable over the Ohyama Patent and the Kobayashi Patent. Dependent claims 2-4, 8, and 10 are believed to be allowable as they further define patentably distinct independent claim 1.

Applicants further note the statement in the Response to Arguments in the Office Action ("no information recovery will be performed, according to the cited decoding references, if no errors are detected") is confusing as Applicants' claims are directed to recovery of at least one information block (or information from an encoded data block)

regardless of whether there are errors or not. The statement seems to say that information recovery is halted when no errors are detected.

Accordingly, the statement appears not to be pertinent to the feature provided by Applicants' claims, namely, that the second decoder is only used when necessary, instead of automatically.

Applicants' independent claim 13 specifies a storage system having an error correction system for coding and decoding at least one information block.

For substantially the same reasons previously presented for the patentability of Applicants' independent claim 1, Applicants' independent claim 13 is patentable over the Ohyama Patent and the Kobayashi Patent. In particular, the Ohyama Patent and the Kobayashi Patent fail to teach or suggest: a first decoder configured to recover the at least one information block and a second decoder configured to recover the at least one information block sequentially in time after operation of the first decoder, wherein the second decoder initiates action to recover the at least one information block only after completion by the first decoder of an unsuccessful attempt to recover the at least one information block and wherein the first decoder and the second decoder are configured to recover the at least one information block via separating the at least one information block from the first parity symbols and the second parity symbols, respectively, as recited in Applicants' independent claim 13. Accordingly, one cannot combine the Ohyama Patent and the Kobayashi Patent and arrive at Applicants' independent claim 13.

For at least these reasons, the Ohyama Patent and the Kobayahsi Patent fail to teach, suggest, or reasonably make obvious Applicants' independent claim 13, and therefore Applicants respectfully submit that independent claim 13 is patentable and allowable over the Ohyama Patent and the Kobayashi Patent. Dependent claims 15 and 17 are believed to be allowable as they further define patentably distinct independent claim 13.

Applicants' independent claim 23 specifies a method of error correction coding and decoding information.

For substantially the same reasons previously presented for the patentability of Applicants' independent claim 1, Applicants' independent claim 23 is patentable over the

Ohyama Patent and the Kobayashi Patent. In particular, the Ohyama Patent and the Kobayashi Patent fail to teach or suggest: (1) recovering the information from an encoded data block, if no errors are present in the encoded data block, via disassembling the encoded data block by removing both the first parity symbols and the second parity symbols from the information; (2) recovering the information from the encoded data block, if an error is present in the encoded data block, by first using the first parity symbols if the information is capable of being recovered using the first parity symbols; and (3) recovering the information from the encoded data block, after using the first parity symbols, by second using the second parity symbols only if recovery of the information was not accomplished by using the first parity symbols, as recited in Applicants' independent claim 23.

Accordingly, one cannot combine the Ohyama Patent and the Kobayashi Patent and arrive at Applicants' independent claim 23.

For at least these reasons, the Ohyama Patent and the Kobayahsi Patent fail to teach, suggest, or reasonably make obvious Applicants' independent claim 23, and therefore Applicants respectfully submit that independent claim 23 is patentable and allowable over the Ohyama Patent and the Kobayashi Patent. Dependent claims 24-27 are believed to be allowable as they further define patentably distinct independent claim 23.

In the Office Action, claims 1-4, 8, 10-15, 17 and 23-27 were rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami US Patent 5,311,522 (the Murakami Patent) in view of the Kobayashi Patent.

The Murakami Patent teaches error correction and checking via an outer code of 4 bytes and an inner code of 8 bytes (Column 1, lines 44-48) in which "after the error correction by the inner code is terminated, error correction by the outer code is performed for correcting the portion which was unable to be corrected by the inner codes. See Column 2, lines 8-12. Moreover, because the lower numbered (4 bytes) outer code correction is applied second in time (i.e. after) the higher numbered (4 bytes) inner code correction (see Column 1, line 62 – Column 2, line 12), the Murakami Patent teaches further away from and opposite from Applicants' claim limitation of the second decoder, which applies a higher numbered second parity symbols, acting after the first decoder (which applies a lower number first parity symbols).

In particular, by teaching performance of an outer code correction having a lower size/number of bytes (e.g., 4 bytes) after an inner code correction of a larger number of bytes (e.g., 8 bytes), the Murakami Patent teaches directly away from the arrangement recited in Applicants' independent claim 1 in which the first decoder and the second decoder (wherein a quantity of the second parity symbols is greater than a quantity of the first parity symbols) are configured to operate sequentially in time with the first decoder acting first and the second decoder acting second.

Moreover, the Murakami Patent goes on to teach away from Applicants' independent claim 1 by teaching and urging that outer code corrections be applied regardless of whether there are no errors, a single error, or multiple errors reported from the inner code correction step. See Table 1 and accompanying description provided at least Column 4, line 37 – Column 5, line 34. The Murakami Patent teaches this arrangement in the belief that a lack of errors found by the inner code correction does not accurately reveal whether or not there are errors in the data because of issues regarding writing new data over old data (i.e., detecting and corrected unerased old data).

Accordingly, the Murakami Patent teaches the use of a second round of error correction (i.e. outer code error correction) that **always** acts even when no errors are reported from the first round of error correction (i.e. inner code correction), and therefore teaches the opposite of Applicants' independent claim 1, which recites that the second decoder is configured to recover the at least one information block via the second parity symbols with the second decoder configured to remain inactive during operation of the first decoder and further remain inactive after operation of the first decoder **unless** the first decoder is unsuccessful in attempting to recover the at least one information block and **until** the first decoder indicates an instruction to the second decoder to recover the at least one information block.

Finally, as noted from the structure of the rejection, the Office Action apparently admits that the Murakami Patent fails to disclose first and second encoders.

The Kobayashi Patent fails to the above-identified deficiencies of the Murakami Patent. In particular, the Kobayashi Patent teaches a decoding process as illustrated in Figure 9 in which data is regenerated with error detection and correction via **both** ECC decoder 47A and ECC decoder 47B with ECC decoder 47B acting **after** ECC decoder 47B.

The Kobayashi Patent does not appear to provide any exception to ECC decoder 47B acting on the data after the ECC decoder 47A, which is in stark contrast to Applicants' independent claim 1 in which a second decoder further remains inactive after operation of the first decoder **unless** the first decoder is unsuccessful in attempting to recover the at least one information block and **until** the first decoder indicates an instruction to the second decoder to recover the at least one information block. Therefore, the second decoder does not act if the first decoder recovers the information.

Accordingly, the Kobayahsi Patent fails to cure the deficiencies of the Murakami Patent.

Neither the Murakami Patent nor the Kobayashi Patent provide the flexibility of Applicants' claimed system which provides enables fast error checking and correction in most instances and invokes a higher level of complexity only when needed. This combination provides faster data processing by limiting the application of slower, high capability error correction circuitry only to situations in which it is needed. Both the Murakami Patent and the Kobayashi Patent are apparently locked into the use of a second decoder, resulting in a much more complex and slower error correction scheme.

Accordingly, one cannot combine the Murakami Patent and the Kobayashi Patent and arrive at Applicants' independent claim 1.

For at least these reasons, the Murakami Patent and the Kobayahsi Patent fail to teach, suggest, or reasonably make obvious Applicants' independent claim 1, and therefore Applicants respectfully submit that independent claim 1 is patentable and allowable over the Murakami Patent and the Kobayashi Patent. Dependent claims 2-4, 8, and 10 are believed to be allowable as they further define patentably distinct independent claim 1.

Applicants' independent claim 13 specifies a storage system for error correction coding and decoding information.

For substantially the same reasons previously presented for the patentability of Applicants' independent claim 1, Applicants' independent claim 13 is patentable over the Murakami Patent and the Kobayashi Patent. In particular, the Murakami Patent and the Kobayashi Patent fail to teach or suggest features of Applicants' independent claim 13 including: (1) the second decoder (which uses a greater number of parity symbols) configured

to recover the at least one information block sequentially in time after operation of the first decoder; and (2) the second decoder initiating action to recover the at least one information block only after completion by the first decoder of an unsuccessful attempt to recover the at least one information block and wherein the first decoder and the second decoder are configured to recover the at least one information block via separating the at least one information block from the first parity symbols and the second parity symbols, respectively.

Accordingly, one cannot combine the Murakami Patent and the Kobayashi Patent and arrive at Applicants' independent claim 13.

For at least these reasons, the Murakami Patent and the Kobayahsi Patent fail to teach, suggest, or reasonably make obvious Applicants' independent claim 13, and therefore Applicants respectfully submit that independent claim 13 is patentable and allowable over the Murakami Patent and the Kobayashi Patent. Dependent claims 15 and 17 are believed to be allowable as they further define patentably distinct independent claim 13.

Applicants' independent claim 23 specifies a method of error correction coding and decoding information.

For substantially the same reasons previously presented for the patentability of Applicants' independent claim 1, Applicants' independent claim 23 is patentable over the Murakami Patent and the Kobayashi Patent. In particular, the Murakami Patent and the Kobayashi Patent fail to teach or suggest the features of Applicants' independent claim 23 including: (1) recovering the information from the encoded data block, if no errors are present in the encoded data block, via disassembling the encoded data block by removing both the first parity symbols and the second parity symbols from the information; (2) recovering the information from the encoded data block, if an error is present in the encoded data block, by first using the first parity symbols if the information is capable of being recovered using the first parity symbols; and (3) recovering the information from the encoded data block, after using the first parity symbols, by second using the second parity symbols (the number of second parity symbols being greater than the first parity symbols) only if recovery of the information could not be accomplished by using the first parity symbols.

Accordingly, one cannot combine the Murakami Patent and the Kobayashi Patent and arrive at Applicants' independent claim 23.

For at least these reasons, the Murakami Patent and the Kobayahsi Patent fail to teach, suggest, or reasonably make obvious Applicants' independent claim 23, and therefore Applicants respectfully submit that independent claim 23 is patentable and allowable over the Murakami Patent and the Kobayashi Patent. Dependent claims 24-27 are believed to be allowable as they further define patentably distinct independent claim 23.

In light of the above, Applicants respectfully request withdrawal of the above rejections of claims 1-4, 8, 10, 13, 15, 17, and 23-27 under 35 U.S.C. §103 and respectfully request allowance of these claims.

CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 1-4, 8, 10, 13, 15, 17, and 23-27 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1-4, 8, 10, 13, 15, 17 and 23-27 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(h)(i). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 08-2025.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to either Wendell Jones at Telephone No. (408) 938-0980, Facsimile No. (650) 852-8063 or Paul S. Grunzweig at Telephone No. (612) 767-2504, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

Hewlett-Packard Company
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

Respectfully submitted,

Kenneth Kay Smith et al.

By their attorneys,

DICKE, BILLIG & CZAJA, PLLC
Fifth Street Towers
100 South Fifth Street, Suite 2250
Minneapolis, MN 55402
Telephone: (612) 767-2504
Facsimile: (612) 573-2005

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PSG:cms

/Paul S. Grunzweig/
Paul S. Grunzweig
Reg. No. 37,143